

Engineering Standards

Los Alamos National Laboratory
Laboratory Implementation Requirement LIR 220-03-01.3
Issue Date: 11/18/1998 , Revised: November 5, 2003

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1.0 Introduction

1.01 Lessons Learned

Note [click here](#) for Lessons Learned *that may apply* to the requirements contained in this LIR.

The requirements in this LIR shall be implemented to ensure that the design and modification of LANL facilities and the programmatic work performed within them is conducted safely, securely (when required), cost effectively, and in a manner adaptable to changing conditions.

The implementation requirements stated in this document complement the performance criteria contained in the following:

LPR 220-03-00, *Facility Project Engineering Design* [click here](#)

LPR 230-04-00, *Conduct of Maintenance* [click here](#)

LPR 240-02-00, *Managing Facility and Tenant Operating Limits and Configuration* [click here](#)

LPR 260-01-00, *Inspection and Testing* [click here](#)

LPR 300-00-00, *Integrated Safety Management* [click here](#)

See Attachment 1 for "Recommended Major Implementation Criteria for Self-Assessment."

2.0 Purpose

All LANL organizations involved in the conduct of non-weapons-component design engineering shall implement the requirements contained in the LANL Engineering Standards (ES) ([click here](#)). The ES identify requirements that shall be applied in the development of new facilities and equipment, and the maintenance and modification of existing facilities and equipment. Requirements required of programmatic work shall be specifically identified in the ES.

ES requirements shall be issued and implemented to supplement those defined in DOE Orders; national and DOE codes and standards; and federal, state, and local codes and regulations in accordance with the following criteria:

- Unique site requirements relative to existing national codes and standards
- Provision of required methods and procedures for engineering work at LANL
- Justifiable unique site application or configuration
- Site-specific lessons learned

3.0 Scope/Applicability

The requirements in this LIR shall apply to all Laboratory personnel and organizations. The requirements of the ES shall also apply to subcontracted design agencies performing engineering services for Laboratory organizations. The ES requirements shall be limited to non-weapons component design

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engineering, including programmatic engineering where specifically identified (weapons component design requirements are maintained by cognizant organizations elsewhere) with the following caveats:

1. No requirements in the ES shall be identified for programmatic work unless prior consensus approval is obtained from programmatic groups (once issued in the ES they do apply)
2. Upon approval of Rev. 1 of this LIR, affected organizations were required to have taken necessary steps to ensure that any such new requirements are implemented for new work within 90 days of notification to LANL POCs. Processes ensuring this were required to be in place beginning 12/21/2001.
3. Engineering projects/work that began prior to November 1, 1998 may continue to implement the original engineering requirements initiated for the activity or may implement the requirements contained in this LIR revision.

The ES define the minimum engineering design requirements that shall be implemented for non-weapons-component structures, systems, and components at LANL. Organizations responsible for the design of LANL structures, systems, and components shall be responsible for ensuring the stated requirements are implemented by their Design Agencies.

Requests for variances and exceptions from the requirements stated in the Engineering Standards Manual (ESM) shall follow the process outlined in LIR 301-00-02, *Variances and Exceptions to Laboratory Operations Requirements* ([click here](#)). Additionally, the request shall receive the approvals of the ES Discipline POC, Engineering Standards Manager, and Chief Engineer prior to submission to the FWO Division Leader (appeals for any disapprovals should be submitted to the next higher authority in turn).

Guidance note: Variances and exceptions to the ESM will generally not expire within a short, defined period, but rather will be effective for the lifetime of the structures, systems, and/or components involved. Request forms should reflect this.

4.0 Acronyms and Definitions

- 4.1 Authority Having Jurisdiction (AHJ)** – The LANL entity empowered with decision-making and enforcement responsibility for a given code, standard, or subject.
- 4.2 Design Agency** – The LANL organization or subcontractor (A/E) responsible for the preparation of engineering design and documentation.
- 4.3 Design Authority** – The individual appointed by the responsible division leader or program manager to be responsible for the acceptability of engineering work for a given Division, Program, or project. This individual shall be responsible for the acceptability of all laws, DOE Orders, national

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codes and standards chosen -- and applicable ES requirements -- to the engineering activities in their functional area of responsibility.

Guidance Note: Per LIR 280-02-01, Institutional Facility Management, FWO is responsible for "ensuring that the Laboratory real property and installed equipment is compliant with applicable codes and standards;" therefore, FWO is responsible for establishing the applicable codes and standards for real property projects.

- 4.4 Engineering Standards (ES)** – The set of manuals containing the LANL engineering standards. The primary manual is the LANL *Engineering Standards Manual*, OST220-03-01-ESM [click here](#). The ESM includes site-specific engineering requirements and design criteria derived from DOE Orders and national codes and standards listed in Appendix G of the DOE/UC contract [click here](#), and other justifiable engineering requirements. A set of standards detail drawings is included. Two companion manuals, the LANL *Construction Specifications Manual*, OST220-03-01-CSM, [click here](#) and LANL *Drafting Manual*, OST220-03-01-DM, [click here](#) are also required.
- 4.5 ES Discipline Point-of-Contact (POC)** – The LANL individual responsible for maintaining sections of the ES generally concerning one engineering discipline (e.g., General, Fire, Civil, Architectural, Structural, Mechanical, Electrical, Instrumentation & Control, Security, Hazardous Process, Radiation Protection, Nuclear, and Welding).
- 4.6 Non-Weapons Engineering** – Any design, engineering, or maintenance-related modification work performed by or for LANL, including work in nuclear manufacturing and experimental facilities, but excluding design work on weapons components themselves (components potentially or actually War Reserve).

5.0 Implementation Requirements

5.1 ORGANIZATIONS/FUNCTIONS USING THE ES

5.1.1 Responsible Leader or Program Manager shall

- Appoint the Design Authority for (a) the project under consideration, (b) daily engineering activities supporting operations and maintenance, or (c) both kinds of engineering if occurring simultaneously in an organization. The Leader/Manager shall make this selection based on qualifications he deems appropriate to the task. This appointment shall be documented by signed memo retrievable from the Division, Program, Facility, or Project office or records storage location.

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5.1.2 Other Division Leaders, Program Managers, Office Directors, or their designees shall

- Assure participation and concurrence in engineering design that affects the work their organization(s) will perform.

5.1.3 Design Authority-appointed engineering lead shall

- Require the responsible engineer(s) and design agencies to apply the requirements contained in the ES in the development of engineering design and documentation.
- Endorse requests for variances and exceptions to the ESM before forwarding to the ES Discipline POC for consideration.

5.2 ORGANIZATIONS/FUNCTIONS MAINTAINING THE ES

5.2.1 ES Manager shall

- Provide day-to-day oversight and direction for ES activities, both technical and administrative.
- Perform high-level tasks including development of long- and short-range goal setting and budget forecasting.
- Perform working-level tasks such as set up and oversight of committees, administrative procedure maintenance, and ES revision administration.
- Maintain general and administrative sections of the ESM.

5.2.2 ES Discipline POCs shall

- Maintain the sections of the ES assigned to their discipline with the assistance of the Engineering Standards Manager and their Committee.
- Respond to all requests for clarification, interpretation, exception, and variance to the ES requirements.
- Function as LANL's AHJs for discipline-specific technical questions relating to ES and other engineering-related standards matters arising from such things as DOE Orders, national, state, and local codes and standards -- when such authority is delegated by the Chief Engineer.

5.2.3 ES OIC (Chief Engineer) shall

- Oversee the ES program

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- Establish and chair a steering committee (ES Board) of primarily Division and Group Leader-level managers from diverse and affected organizations.
- Advise the FWO Division Leader to either accept or reject LIR variance and exception requests forwarded from the Standards Manager.
- Be the Authority Having Jurisdiction for discipline-specific technical questions relating to ES and other engineering-related standards matters arising from such things as DOE Orders, national, state, and local codes and standards when no other LANL AHJ has been appointed by the Lab Director (can be delegated to Discipline POCs).

Guidance Note: To further illustrate the AHJ role: The Chief Engineer would be the AHJ for the application of the Mechanical and Plumbing Codes, though he might delegate that responsibility to the ES Mechanical POC (e.g., by way of ESM Chapter 1 Section 100). However, since the Electrical Safety Committee was appointed the AHJ for NFPA 70 -- *National Electric Code* by the Director, neither the Chief nor the ES Electrical POC would be the AHJ in those issues. Likewise, the LANL Fire Marshal is the AHJ for fire protection issues, not the Chief or ES Fire POC.

5.2.4 ES Committees

- Assist their associated Discipline POCs with technical decision-making and material development and maintenance
- Actively encourage the participation of personnel from a representative cross-section of affected lab functions.

5.2.5 ES Board

- Oversee the management of the ES program
- Authorize new ESM requirements

5.3 ADMINISTRATION

The formal process requirements defined in the ES shall be applied to the initiation, preparation, revision, and approval of engineering requirements contained therein.

5.3.1 Revisions to the ES

Revisions, additions, and deletions to the ES shall be in accordance with the administrative sections of the ES.

Following the completion of the approval process for a new or revised engineering requirement, the document shall be revised and notification shall be made to affected organizations. Following

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commenting and comment resolution, 90 days shall be allowed from the date of issuance for the implementation of new requirements. The new requirements shall apply to all new projects/activities initiated after that date. Projects underway shall continue implementation of the requirements contained in the previous revision, unless the responsible Design Authority directs the application of the new requirement. If this is done, it shall be noted as part of the design package documents.

Guidance Note: LANL Supply Chain Management Division contract provisions specify that the required standards for a project are those in effect on the date of the solicitation unless the Request for Proposal specifically invokes a different set.

5.3.1.1 Projects Underway

For major projects performed under the requirement of LIR220-01-01, *Construction Project Management*, the point used for determining the application of the ES shall be at the beginning of the effort to develop the statement of work for A/E design services. Projects that have achieved this milestone shall be considered “underway” for the purpose of this LIR, as shall General Plant Project (GPP) activities and Line Item projects that have reached a similar point.

For engineering performed under the jurisdiction of the Facility Manager as defined in LIR 230-03-01, *Facility Management Work Control* ([click here](#)), the point used for determining applicability of the ES revision shall be the FM’s approval to proceed with final design. Work that has achieved this milestone shall be considered “underway” for purposes of this LIR.

5.4 CONTENT AND FORMAT

The ESM shall clearly define or describe the specific design requirements and reference the source (basis) of any new requirements. Requirements that are adopted as a result of commitments made to the DOE or other regulatory bodies as a result of inspections, audits, or accident investigations shall reference the specific report where the commitment was made.

Guidance note: Implementation guidance or industry/laboratory good practices may be included as part of the ESM as an aid in implementing the requirements stated. These are clearly presented and identified as a good practice and guidance, not as mandatory requirements.

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6.0 Documentation/Records

None.

7.0 References

7.1 Document Ownership

The OIC for this LIR is the Chief Engineer of the Facilities and Waste Operations Division.

7.2 Documents

- LIR 220-01-01, *Construction Project Management*
- LIR 230-03-01, *Facility Management Work Control*
- LIR 301-00-02, *Variances and Exceptions to Laboratory Operations Requirements*
- LPR 220-03-00, *Facility Project Engineering Design*
- LPR 230-04-00, *Conduct of Maintenance*
- LPR 240-00-00, *Managing Facility and Tenant Operating Limits and Configuration*
- LPR 260-01-00, *Inspection and Testing*
- LPR 300-00-00, *Integrated Safety Management*
- UC/DOE Contract No. W-7405-ENG-36, Appendix G and Work Smart Standards

8.0 Attachments

Attachment 1: Recommended Major Implementation Criteria for Self-Assessment

(Non-Mandatory)

| LIR Title | LIR Number |
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The major implementation criteria listed below are provided to assist Laboratory organizations assess their implementation of this LIR. These criteria provide an objective basis for self-assessing implementation of the major requirements contained in the LIR. The LIR also states requirements in other areas, such as, scope, precautions, and responsibilities that, when applied, complement the successful implementation of these major requirements.

The recommended major implementation criteria for self-assessment of this LIR are as follows:

- Ensure all in-house and external design personnel aware of the requirement to apply the requirements contained in the ES in the development of engineering design and documentation.
- Demonstrate that requirements contained in the ES are applied to development, design and execution of all non-weapons component engineering work at LANL.
- Show that variances and exceptions from the engineering requirements of the ESM shall follow the process outlined in LIR 301-00-02.0, *Variances and Exceptions to Laboratory Operations Requirements*, with the added steps of requiring the approval of the ES Discipline POC and Standards Manager and Chief Engineer prior to submission to the FWO Division Leader.